

Webinar Discussion 2/8/18 RBW Outline on Quarry & Halawa Valley, Geology, and Geochemical interpretations

- 1) The purpose of the groundwater investigation is to evaluate the risk the facility poses to groundwater in general and drinking water in particular.
- 2) A lot of really good data have been collected
 - a) Will provide valuable insight into Oahu hydrogeology
 - i) When large data sets become available the frequently get used extensively (based on experience)
 - ii) Use means this data will continue to be interpreted after the reports are written
 - iii) For the purposes of groundwater/drinking water risk evaluations as wells as the fact that these data will continue to be scrutinized it is important our conclusions are as defensible as possible
- 3) Three basic questions need to be answered:
 - a) What direction and distance will LNAPL travel in the vadose zone for a range of release scenarios;
 - b) Once the LNAPL reaches the water table where will it go; and
 - c) As the LNAPL dissolves where and how far will dissolved plume travel?
- 4) The preliminary conclusions strongly imply that the combination of geology, hydrology, and non-Red Hill anthropogenic activities in the vicinity of the Facility create conditions that are at least protective of the Halawa Shaft drinking water source. The evidence supporting these conclusions are:
 - a) Quarry excavations and operations result in an elevated water table between the Facility and the Halawa Shaft;
 - b) Water levels at RHMW07 and HDMW225-03 show that the groundwater elevation is higher to the Northwest of the Facility than beneath the Tank Farm;
 - c) Groundwater chemistry confirms a mauka to Makai groundwater flow direction beneath the Facility and may also indicate groundwater flow from the Halawa side of S. Halawa Stream to the west end of the Facility;
 - d) The lava beds dip in a direction away from the Halawa Shaft.
- 5) If all or most of the conclusions above are true, it would seem logical that hydrologic and geologic conditions in the Red Hill/Halawa area exist that are protective of the Halawa Shaft
- 6) However, it needs to be shown by an objective and balanced evaluation of the all of the available data that these preliminary conclusions are valid. In the absence of such rigorous evaluation the most protective conclusions need to prevail.

- 7) While there is good logic presented to support the preliminary conclusions, it appears not all of data or alternatives have been given equal starting weight and sufficient data have not been made available for a peer review of the conclusions. For example:
- a) It has not been shown what rate of infiltration at the quarry is needed to elevate the water table sufficiently to create a hydraulic barrier
 - i) The cited infiltration rate of 8 mil. gal. per month does not seem sufficient, particularly since about half of that volume leaves the site in product
 - b) It still remains to be shown that the water levels measured in RHMW07 and HDMW2253-03 that are higher than those beneath the tank farm should be given more weight than the water level in RHMW06 that is lower than what is measured beneath the tank farm.
 - i) There are issues with both RHMW07 and HDMW2253-03 that would indicate these water levels should be given lessor weight than that in RHMW06
 - c) While it is true that RHMW01 & 02 are at one end of a grouping in the Piper Diagrams and OWDFMW1 is at the other end of that grouping, the validity of using this approach to validate a groundwater flow path can't be ascertained unless the location and chemistry of the wells along the hypothesized path are fully scrutinized. It appears looking at these diagrams any number of groundwater flows paths can be hypothesized including in the Makai to mauka direction (opposite of what is proposed!). If pursued, this line of logic needs to be re-evaluated and the conclusions better supported.
 - d) Finally, knowledge of the dip direction of the lava bedding and the connectivity of more permeable flow paths are very important to understanding both vadose zone and saturated zone zone transport of the LNAPL and dissolved constituents. Sufficient supporting data, that are not currently available outside of the Navy's team, need to be made available so the members of the EPA/DOH team can understand and evaluate how stated geologic geometry was arrived at.
- 8) TRANSITION TO MATT AND GD